

REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the present amendments and following discussion, is respectfully requested.

Claims 1-18, 20 and 22-29 are pending. Claims 23-29 are newly added. Claims 1 and 22 are amended. Support for the amendments to Claims 1 and 22 is self-evident. Support for newly added Claims 23-29 can be found in the published application in numbered paragraphs [0103] - [0107], for example. No new matter is added.

In the outstanding Office Action, Claims 1, 2, 4-9, 11, 12, 14-17, 18-20, and 22 were rejected under 35 U.S.C. § 103(a) as obvious over Buldhaupt et al. (U.S. Patent No. 5,994,666, herein "Buldhaupt") in view of Fujita et al. (U.S. Patent No. 6,448,530, herein "Fujita"). Claims 3, 10, and 13 were rejected under 35 U.S.C. § 103(a) as obvious over Buldhaupt, Fujita, Sanders (U.S. Patent Pub. 2002/0179688, herein "Sanders") and Weisert et al. (U.S. Patent No. 4,220,276, herein "Weisert").

At the outset, Applicants note with appreciation the courtesy of a personal interview granted by Examiner Michael Aboagye to Applicants' representative. In combination with the Interview Summary provided by Examiner Aboagye, the substance of the personal interview is provided below in accordance with MPEP § 713.04.

Regarding the rejection of Claims 1, 2, 4-9, 11, 12, 14-17, 18-20, and 22 as obvious over Buldhaupt in view of Fujita, that rejection is respectfully traversed by the present response.

Independent Claim 1 recites:

A method of fabricating a hollow mechanical part by diffusion welding and superplastic forming, the method comprising the following steps:

- a) providing at least two primary parts of superplastic material, said primary parts having two faces and a periphery;
- b) providing an anti-diffusion substance and depositing said anti-diffusion substance in a predefined pattern on at least one face of said two faces of said primary parts;

- c) stacking-up and assembling said primary parts together at their said periphery, with the exception of a passage-forming location, said primary parts forming a stack and defining between them a cavity, said at least one face being placed facing into said cavity;
- d) diffusion welding the stack under isostatic pressure;
- e) placing the welded assembly in a mold; and
- f) raising said mold to the superplastic forming temperature and injecting an inert gas at the superplastic forming pressure via said passage into said cavity, thereby causing the stack to inflate and implementing superplastic forming in at least one zone, enabling a blank of the mechanical part to be obtained;

wherein step b) is performed in application of the following sequence of operations:

- b1) applying a layer of anti-diffusion substance comprising a powder over the entire surface of said at least one face of the primary parts;
- b2) localized sintering of the anti-diffusion substance, without melting the powder, in said predefined pattern by the heating that results from localized application of a laser beam directly onto said powder along a track made up of the at least one zone prior to the stacking-up, thereby producing, in said at least one zone, both bonds between the particles of powder and also a diffusion phenomenon between the particles of powder and the material of said at least one face of the primary part; and
- b3) removing the anti-diffusion substance from regions that are not subjected to the laser beam.

Accordingly, in providing the anti-diffusion substance on one face of the primary part, a layer of anti-diffusion substance comprising a powder is applied over an entire surface of at least one face of the primary parts. Next, a laser beam is directly applied to the powder to sinter the anti-diffusion substance. This step is performed before the primary parts are stacked. The anti-diffusion substance is then removed from regions that are not subjected to the laser beam.

As discussed during the personal interview, one benefit of the above-noted process is that the anti-diffusion substance is made to adhere to the primary part so that anti-diffusion substance does not undesirably move around after it is applied. Thus, the process described above reduces the probability that the anti-diffusion substance will accidentally enter into

areas where diffusion bonding between the primary parts is desired. Additionally, the process reduces the probability that the anti-diffusion substance will fall off of areas where diffusion bonding is not desired.

In contrast, Buldhaup applies an anti-diffusion substance, stacks up its primary parts, and then applies a laser from outside the stack to weld the stacked parts together. The outstanding Office Action acknowledges that Buldhaup does not teach applying a laser beam directly to an anti-diffusion substance prior to stacking up the parts or part coated with the anti-diffusion substance.¹ The outstanding Office Action relies on Fujita for the above-noted feature.²

As discussed during the personal interview, Fujita does not apply a laser beam to an anti-diffusion substance prior to stacking up parts. Rather, as discussed during the personal interview, Fujita, in embodiment No. 3, applies a laser to a **filler material** (6). The filler material (6) is deposited in the pool grooves (2) as shown in Figs. (10a) and (10b). Fujita applies a laser to the filler material (6) deposited in the pool grooves (2) to coagulate the filler material (6). Once the filler material (6) is coagulated, the remaining filler material, which was not exposed to a laser, (6) is removed. In this way, the pool grooves (2) are filled with a solid material (filler material) in order to form hexagonal shapes as is desired in the metal mold (1).

Applicants respectfully submit that a person of ordinary skill in the art would not consider the filler material (6) to be an **anti-diffusion** substance as recited in amended independent Claim 1. Rather, the filler material (6) becomes an integral part of the structure (hexagonal shapes) of the metal mold (1). No diffusion welding of the mold is required by the process described in Fujita, and therefore, no anti-diffusion substance is suggested for controlling any diffusion welding. Accordingly, Applicants respectfully submit that Fujita

¹ Outstanding Office Action, page 3.

² Id.

does not directly apply a laser to an **anti-diffusion substance** as recited in independent Claim 1.

Thus, no reasonable combination of Buldhaup and Fujita would include localized application of a laser beam directly onto the powder along a track prior to stacking up primary parts, wherein the powder is part of an anti-diffusion substance as recited in amended independent Claim 1.

Additionally, as discussed during the personal interview, the embodiment in Fujita in which a laser is applied to the filler material (6) does not involve any "stacking up" of parts. Rather, as shown in Fig. 10B, the pool grooves (2), slit grooves (3), and filler material (6) are deposited in a part of the metal mold (1) that is integral with the part of the mold that includes feed holes (11). In other words, in Fujita, the laser is applied to filler material that is deposited on a component that is not "stacked up" with any other part.

Instead, the component on which the filler material (6) is deposited is a single, integral component as shown in Fig. 11(a). Accordingly, as discussed during the personal interview, Applicants further respectfully submit that not only does Fujita fail to suggest applying a laser directly to an anti-diffusion substance, Fujita fails to teach or suggest that a laser is applied to any component before stacking up of that component. Rather, the only time Fujita stacks up one part with another is in a different embodiment using electro-discharge-machining to create the hexagonal shapes required by Fujita. This embodiment does not include applying a laser to a filler material (6), much less directly applying a laser to an anti-diffusion substance. Accordingly, Applicants respectfully submit that independent Claim 1 further patentably distinguishes over any proper combination of Buldhaup and Fujita for at least the additional reasons discussed above.

As further discussed during the personal interview, Buldhaup is related to superplastic deformation of sheet-like components. Fujita is directed to a method of making

a mold. Applicants respectfully submit that a person of ordinary skill in the art of diffusion bonding sheets of material together for aircraft components would not have been led by Fujita to incorporate directly applying a laser to any component, much less to an anti-diffusion substance as is described in Buldhaupt. Rather, Buldhaupt and Fujita are in non-analogous arts. Accordingly, Applicants respectfully submit that independent Claim 1 further patentably distinguishes over any proper combination of Buldhaupt and Fujita for at least the additional reasons discussed above.

Independent Claims 14 and 22 recite substantially similar features to those discussed above regarding independent Claim 1 and patentably distinguish over any proper combination of Buldhaupt and Fujita for at least the same reasons.

Claims 2-13, 15, 16, 18, 19, and 22-29 each depend from one of independent Claims 1, 14, and 17. Accordingly, Applicants respectfully submit that Claims 2-13, 15, 16, 18-20, and 22-29 patentably distinguish over any proper combination of Buldhaupt and Fujita for at least the same reasons as independent Claims 1, 14, and 17 do.

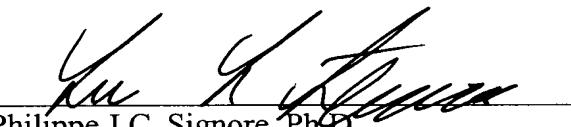
The outstanding Office Action relies on Sanders and Weisert for specific materials used in the anti-diffusion substance and for the particle size of the anti-diffusion substance. However, Applicants respectfully submit that neither of Sanders and Weisert remedies the deficiencies discussed above regarding Buldhaupt and Fujita.

For the foregoing reasons, it is respectfully submitted that this application is now in condition for allowance. A Notice of Allowance for Claims 1-18, 20, and 22-29 is earnestly solicited.

Should Examiner Aboagye deem that any further action is necessary to place this application in even better form for allowance, he is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.


Philippe J.C. Signore, Ph.D.
Attorney of Record
Registration No. 43,922

Lee L. Stepina
Registration No. 56,837

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

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